

Listing of the Claims

1. (Currently Amended) An x-ray tube ~~(12, 212)~~ that injects an x-ray conebeam into an examination region ~~(14)~~, the x-ray tube ~~(12, 212)~~ including:

a rotating cylindrical anode ~~(30, 230, 330, 430)~~ having a target outer surface region, the cylindrical anode ~~(30, 230, 330, 430)~~ rotating about a longitudinally aligned cylinder axis ~~(32)~~;

an electron accelerating means ~~(54, 56, 254, 256)~~ for accelerating electrons toward at least one selected spot on the target outer surface region of the cylindrical anode ~~(30, 230, 330, 430)~~ to generate x-rays; and

a sweep means ~~(64, 68, 270)~~ for relatively longitudinally sweeping the at least one selected spot across the target outer surface region of the cylindrical anode ~~(30, 230, 330, 430)~~.

2. (Currently Amended) The x-ray tube as set forth in claim 1, wherein the cylindrical anode ~~(30, 230, 330, 430)~~ includes:

a central supporting cylinder ~~(350)~~; and

a metallic layer ~~(352)~~ at least a portion of which defines the target outer surface region.

3. (Currently Amended) The x-ray tube as set forth in claim 2, wherein the central supporting cylinder ~~(350)~~ includes:

an outer shell ~~(450)~~ defining a hollow cylinder core; and

at least one structural support member ~~(452)~~ disposed in the hollow cylinder core, the at least one structural support member ~~(452)~~ mechanically coupled to an associated rotating shaft ~~(440)~~.

4. (Currently Amended) The x-ray tube as set forth in claim 2, wherein the metallic layer ~~(352)~~ is a tungsten coating.

5. (Currently Amended) The x-ray tube as set forth in claim 1, wherein the cylindrical anode ~~(30, 230, 330, 430)~~ includes:

a substantially solid metallic cylinder ~~(30, 230)~~, at least a portion of an outer surface of said solid metallic cylinder ~~(30, 230)~~ defining the target outer surface region of the cylindrical anode.

6. (Currently Amended) The x-ray tube as set forth in claim 1, wherein the cylindrical anode ~~(30, 230, 330, 430)~~ includes:

a substantially hollow outer cylindrical shell ~~(450)~~; and

at least one structural support member ~~(452)~~ disposed in the substantially hollow outer cylindrical shell ~~(450)~~, the at least one structural support member ~~(452)~~ mechanically coupled to an associated rotating shaft ~~(440)~~.

7. (Currently Amended) The x-ray tube as set forth in claim 1, wherein the accelerated electrons define an electron beam ~~(60, 260)~~, and the sweep means ~~(64, 68, 270)~~ includes:

an electron deflector ~~(64, 68)~~ that selectively deflects the electron beam ~~(60, 260)~~ to sweep the at least one selected spot across the target outer surface region of the cylindrical anode.

8. (Currently Amended) The x-ray tube as set forth in claim 7, further including:

a rotating cylindrical helical-slot collimator ~~(90)~~ having a helical collimating slot ~~(92)~~ formed therein, the collimator ~~(90)~~ surrounding the rotating cylindrical anode ~~(30, 330, 430)~~ and rotating about a collimator axis ~~(91)~~ parallel to the cylinder axis ~~(32)~~, a helical pitch of the helical collimating slot ~~(92)~~ and a rotation rate of the collimator ~~(90)~~ being selected relative to the sweep of the at least one selected spot such that the at least one selected spot coincides with the helical-slot ~~(92)~~ during the sweeping.

9. (Currently Amended) The x-ray tube as set forth in claim 8, further including:

an evacuated frame ~~(36)~~ that surrounds the rotating cylindrical anode ~~(30, 330, 430)~~, the rotating cylindrical helical-slot collimator ~~(90)~~ being arranged outside of the evacuated frame ~~(36)~~.

10. (Currently Amended) The x-ray tube as set forth in claim 8, wherein the rotating cylindrical helical-slot collimator ~~(90)~~ includes:

an outer cylindrical shell ~~(100)~~ surrounding the rotating cylindrical anode ~~(30, 330, 430)~~ and aligned with the collimator axis ~~(91)~~, the outer cylindrical shell ~~(100)~~ having a first helical slot defined therein; and

an inner cylindrical shell ~~(102)~~ surrounding the rotating cylindrical anode ~~(30, 330, 430)~~ and disposed inside the outer cylindrical shell ~~(100)~~, the inner cylindrical shell ~~(102)~~ being aligned with the collimator axis ~~(91)~~ and having a second helical slot defined therein that aligns with the

first helical slot, the first and second helical slots cooperatively defining the helical collimating slot ~~(92)~~.

11. (Currently Amended) The x-ray tube as set forth in claim 10, wherein the outer and inner cylindrical shells ~~(100, 102)~~ are secured together and rotate as a unit.

12. (Currently Amended) The x-ray tube as set forth in claim 8, further including: a fixed axially limiting collimator ~~(106)~~ that axially limits the x-rays.

13. (Currently Amended) The x-ray tube as set forth in claim 1, wherein the sweep means ~~(64, 68, 270)~~ includes:
a longitudinal reciprocating mechanism ~~(270)~~ longitudinally reciprocating the cylindrical anode ~~(230, 330, 430)~~ to effect a longitudinal reciprocating sweep of the at least one selected spot across the target outer surface region of the cylindrical anode ~~(230, 330, 430)~~.

14. (Currently Amended) A CT scanner including:
a rotating gantry ~~(22)~~ which rotates around an examination region and an axis of revolution, the x-ray tube ~~(12, 212)~~ of claim 1 being mounted to the rotating gantry with the cylinder axis ~~(32)~~ parallel to the axis of revolution;
an x-ray detector ~~(16)~~ arranged to detect x-rays after the x-rays pass through the examination region; and
a reconstruction processor ~~(120)~~ for reconstructing output signals from the x-ray detector into an image representation.

15. (Currently Amended) The computed tomography imaging system as set forth in claim 14, further including:
a synchronization circuit ~~(132)~~ that synchronizes the sweep with rotation of the rotating gantry ~~(22)~~.

16. (Currently Amended) The computed tomography imaging system as set forth in claim 14, further including:
a rotating cylindrical helical-slot collimator ~~(90)~~ having a helical collimating slot ~~(92)~~ formed therein, the collimator ~~(90)~~ surrounding the rotating cylindrical anode ~~(30, 330, 430)~~ and rotating about a collimator axis ~~(91)~~ that is parallel to the cylinder axis ~~(32)~~, a helical pitch of the helical collimating slot ~~(92)~~ and a rotation rate of the collimator ~~(90)~~ being selected relative to the

sweep of the at least one selected spot such that the at least one selected spot coincides with the helical-slot ~~(92)~~ during the sweeping.

17. (Currently Amended) A method of generating x-rays including:
 rotating a cylindrical anode ~~(30, 230, 330, 430)~~ about a cylinder axis ~~(32)~~, the cylindrical anode ~~(30, 230, 330, 430)~~ having a cylindrical target outer surface region;
 accelerating electrons toward at least one selected spot on the target outer surface region of the cylindrical anode ~~(30, 230, 330, 430)~~ to generate x-rays; and
 relatively sweeping the at least one selected spot continuously across the target outer surface region of the cylindrical anode ~~(30, 230, 330, 430)~~ along a beam trajectory substantially parallel to the cylinder axis ~~(32)~~.

18. (Currently Amended) The method as set forth in claim 17, wherein the relative sweeping includes:
 steering at least one electron beam ~~(60)~~ defined by the accelerated electrons longitudinally across the cylindrical anode ~~(30, 330, 430)~~.

19. (Currently Amended) The method as set forth in claim 17, wherein the relative sweeping includes:
 fast-retracing the at least one electron beam ~~(60)~~ to return to a longitudinal sweep starting point subsequent after each longitudinal sweep across the cylindrical anode ~~(30, 330, 430)~~.

20. (Currently Amended) The method as set forth in claim 17, wherein the relative sweeping includes:
 longitudinally reciprocating the cylindrical anode ~~(230, 330, 430)~~ to effect longitudinal reciprocating sweeping of the at least one selected spot on the target outer surface region of the cylindrical anode ~~(230, 330, 430)~~.

21. (Currently Amended) The method as set forth in claim 17 further including:
 rotating a helical-slot collimator ~~(90)~~ around a collimator axis ~~(91)~~ that is parallel to the cylinder axis ~~(32)~~; and
 sweeping the at least one selected spot in coordination with rotating the helical-slot collimator.

22. (Currently Amended) The method as set forth in claim 21 wherein the collimator axis ~~(91)~~ corresponds to the beam trajectory.

23. (Currently Amended) The method as set forth in claim 21 wherein the at least one selected spot includes a plurality of spots separated by a helical pitch of a helical slot of the helical-slot collimator that generate a corresponding plurality of x-ray beams ~~(76, 76')~~.

24. (Currently Amended) The method as set forth in claim 17, further including:
rotating the cylindrical anode ~~(30, 230, 330, 430)~~ around an axis of rotation, the axis of rotation being parallel to the cylindrical axis ~~(32)~~;
sweeping the at least one selected spot in coordination with the rotating;
detecting the x-rays which have passed through a subject along the axis of rotation;
converting the detected x-rays into an image of the subject.